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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/746,823	12/22/2000	Erik Bengtsson	8194-453IP	8910

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EXAMINER	
TRAN, KHANH C	

ART UNIT	PAPER NUMBER
2631	5

DATE MAILED: 11/05/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/746,823	Applicant(s) BENGTSSON ET AL.	
	Examiner Khanh Tran	Art Unit 2631	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2000* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-10,12,15-20,22-28,30 and 33-36* is/are rejected.

7)☒ Claim(s) *2,11,13,14,21,29,31 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1, 3-10, 12, 15-20, 22-28, 30 and 33-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'Loughlin U.S. Patent 5,705,959 in view of Anzil U.S. Patent 6,236,267 B1.

Regarding claims 1 and 20, O'Loughlin invention applies to complex modulation in which the signals are combinations of both amplitude and frequency modulation. Figure 6 illustrates an analog implementation of O'Loughlin invention in which input the single side band input (SSB) is generated by a quadrature modulation process as illustrated in figure 4. Referring to figure 6 again, the SSB signal g(t) is directed to an amplitude modulation (AM) envelope detector 66 and a phase detector 62. One skilled in the art would recognize that combination of figure 4, phase detector 62 and the AM envelope detector 66 would constitute the claimed digital signal processor. Even though O'Loughlin teachings shows the SSB signal is generated by an analog implementation, however, as well known in the art, a digital signal processor, such as a Direct Digital Synthesis (DDS) circuit as shown in the second reference, can be used to generate in-phase and quadrature-phase signals. Furthermore, it should be apparent to one skill in the art that combination of the phase detector 62 and phase modulator 63 constitutes a

phase locked loop as claimed in the instant application. Figure 6 further shows a class "C" amplifier 65 having a signal input responsive to the phase modulator 63, an amplitude control input responsive to the AM high level modulator 67, and an output. O'Loughlin invention, however, lacks details of the PLL. Anzil discloses a similar system in figure 1 having a phase compensator 101 and an amplitude compensator 102. The phase compensator 101 includes a PLL 142 having a voltage-controlled oscillator (VCO) 155, which has an output coupled to a power amplifier PA. O'Loughlin and Anzil teachings do not show the quadrature modulator is part of the PLL, however, the foregoing limitation could be easily implemented as a design choice. Both O'Loughlin and Anzil inventions are directed to the amplification of complex modulated signals, and more particularly to their amplification with high efficiency and low distortion. O'Loughlin shows a general concept of the implementation, while Anzil disloses more component details.; therefore, combining both teachings would have been obvious for one of ordinary skill in the art.

Regarding claims 3 and 22, normalization of the in-phase and quadrature-phase signals such that the modulated signal is a constant amplitude modulated signal is a design choice and could be easily implemented.

Regarding claims 4 and 23, in addition of the argument rejection of claim 3, O'Loughlin further shows in figure 7 a embodiment of a digital implementation wherein the phase angle is $\tan^{-1}$of the quadrature-phase signal divided by the in-phase signal. As recited in claim 3, normalization of the in-phase and quadrature-phase signals is a

design choice and utilizing the foregoing phase angle for normalization would have been apparent to one skill in the art.

Regarding claims 5 and 24, in addition of the argument rejection of claim 4, referring to figure 7 again, unit 74 representative of the AM envelope detector unit 66 in figure 6 in digital format contains the square root of a sum of the in-phase signal squared and the quadrature-phase signal squared generated by the unit 72.

Regarding claims 6 and 25, Anzil discloses in figure 1, the AM detector 190 receives the output signal generated by the PA 120 via the directional coupler 115 and generates a signal representative of the signal amplitude, which corresponds to the claimed power control signal. Hence, the amplitude control input is responsive to both the amplitude signal and the signal representative of the signal amplitude.

Regarding claims 7 and 26, both O'Loughlin and Anzil do not show an amplifier followed by a power amplifier. Instead, Anzil only shows a power amplifier PA followed by a transmit antenna 110. However, having an amplifier in front of the PA would have been obvious to one skilled in the art since the amplifier would smooth out the amplification process before being amplified by the power amplifier PA.

Regarding claims 8 and 27, figure 1 of Anzil invention shows a transmit antenna 110 in responsive to the power amplifier PA. Figure 4 of O'Loughlin invention shows information signal a(t) is inputted to generate quadrature signals. O'Loughlin does not show a user interface generating a(t), however, as well known in the art, a user interface is always implied at the input.

Regarding claim 9, a power amplifier PA is shown in figure 1 of Anzil invention.

Regarding claims 10 and 28, in addition to the argument rejection of claim 1, referring to figure 6 of O'Loughlin invention, combination of the phase detector 62 and phase modulator 63 is representative of the claimed phase tracking system independent of amplitude changes in the modulated signal. Similarly, combination of AM envelope detector 66 and AM high level modulator 67 is representative of the claimed amplitude tracking system independent of amplitude changes in the modulated signal. Both O'Loughlin and Anzil do not show the quadrature modulator is part of the PLL, however, the foregoing limitation could be easily implemented as a design choice.

Regarding claims 12 and 30, figure 1 of Anzil invention shows an amplitude control parameter generator 180 responsive to the feedback modulated signal to generate an amplitude signal. Hence, the amplitude control parameter generator 180 performs as the claimed automatic gain control subsystem.

Regarding claims 15 and 33, referring to figure 1 of Anzil invention, the amplitude control parameter generator 180 includes an AM detector 190 responsive to the feedback modulated signal.

Regarding claims 16 and 34, referring to figure 1 of Anzil invention, a hard limiter 140 is located between DDS 132 and a PLL 142.

Regarding claims 17 and 35, as recited in claim 7, both O'Loughlin and Anzil do not show an amplifier followed by a power amplifier. Instead, Anzil only shows a power amplifier PA followed by a transmit antenna 110. However, having an amplifier in front of the PA would have been obvious to one skilled in the art since the amplifier would

smooth out the amplification process before being amplified by the power amplifier PA. The power amplifier PA in figure 1 O'Loughlin is followed by an antenna 110.

Regarding claims 18 and 36, said claim is rejected using similar rejection argument of claim 8.

Regarding claim 19, said claim is rejected using similar rejection argument of claim 9.

Allowable Subject Matter

2. Claims 2, 11, 13-14, 21, 29 and 31-32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Specification

3. The abstract of the disclosure is objected to because the title "I/Q Modulation Systems and Methods That Use Separate Phase and Amplitude Signal Paths and Perform Modulation within a Phase Locked Loop" should be deleted from the Abstract. Correction is required. See MPEP § 608.01(b).

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

McCune, Jr. et al. U.S. Patent 5,952,895 discloses "Direct Digital Synthesis of Precise, Stable Angle Modulated RF Signal".

Chaplik et al. U.S. Patent 5,412,353 discloses "Phase-Locked Loop Frequency Modulation Circuit for Input Modulation Signals having Low-Frequency Content".

McMahill et al. U.S. Patent 5,737,694 discloses "Highly Stable Frequency Synthesizer Loop with Feedforward".

Trichet et al. U.S. Patent 6,211,747 B1 discloses "Wideband Modulated Fractional-N Frequency Synthesizer".

Minnis et al. U.S. Patent 6,420,940 B1 discloses "Transmitter with a Phase Modulator and a Phase-Locked Loop".

Isumi U.S. Patent 4,952,888 discloses "Phase-Locked Loop for Direct Modulation".

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khanh Tran whose telephone number is 703-305-2384. The examiner can normally be reached on Tuesday - Friday from 08:00 AM - 05:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 703-306-3034. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3800.

KCT

10/31/03

KHAI TRAN
PATENT EXAMINER